PCAS 2010

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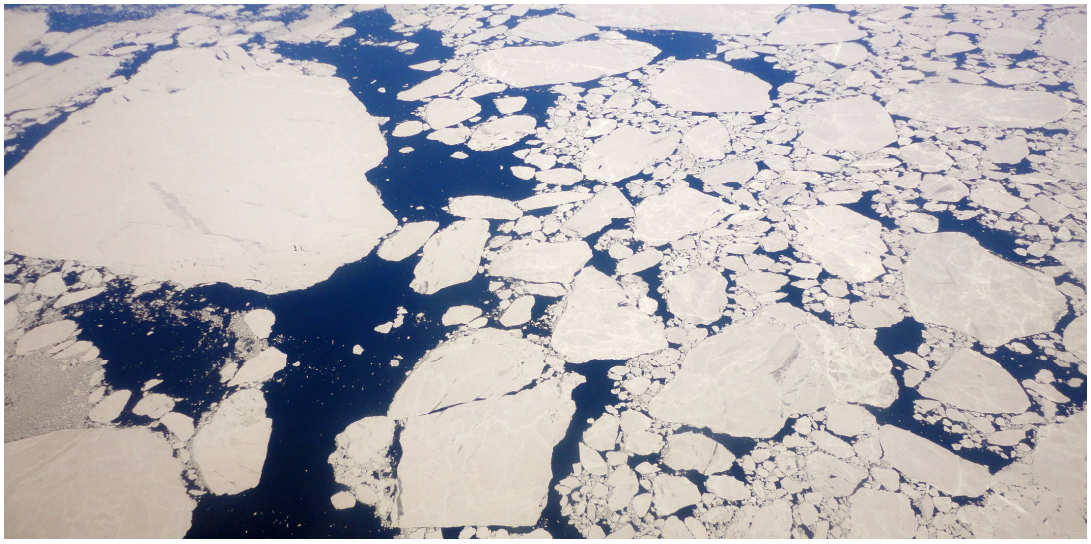

Antarctic Urban: exploring *Terra Fluxus*

ANTA604

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Introduction

As far as the eye could see from the crow's nest of the Nimrod, the great, white, wall sided ice bergs stretched east, west and south, making a striking contrast with the lanes of blue-black water between them. A stillness, weird and uncanny, seemed to have fallen upon everything when we entered the silent water streets of this vast unpeopled white city.
- Sir Ernest Shackleton

When civilization expanded to Antarctica, the image of the city was one that traveled with it. There can be no doubt though, that the metaphor of the city evoked by Shackelton, from the crows nest of the Nimrod, as she steamed between the tabular ice bergs of the Ross Sea, was vastly different from the cities we've come to identify with today. Over the last century the notion of what constitutes an 'urban' condition has diversified and been vigorously debated, and with this the meaning of 'urban' has changed. In spite of the transformation, it would appear, at least to some extent, that Shackleton's imagery captures the contemporary condition no less appropriately than it did in 1908.

Over the course of the last century there has been progressive shift in the focus of urban design theory, from buildings representing the primary form to an understanding and appreciation of landscape as an exchange media and vessel for the various cultural, ecological and economic processes that operate in and on the cities of today. Shackleton's Antarctic figure/ground, inverted, with the buildings as white and the streets and canals as dark blue-black, is almost perfectly tailored to the emerging significance landscape in the contemporary city [Figure 1].

At this interface between ocean and cryosphere the dynamic relationships revealed through the observations of modern science, tell a story of the bergs poised in continuous state of flux, with the exchange of energy across surfaces occurring at scales ranging from the molecular to the geographic. This metaphor too is appropriate for the contemporary understanding of the city. In his essay *Terra Fluxus*, (Corner, 2006) Landscape Architect and Urbanist, James Corner, provides a thematic outline for the emerging urban practice known as 'landscape urbanism'. Corner calls for a synthetic design practice which, draws on complex interactions across scales; combines architecture, landscape architecture, urban design, engineering, planning and ecology; and asserts that a conflation of the formerly opposing though contested concepts of 'landscape' and 'urbanism' is required, if "the

architectural and planning arts [are] to make any real or significant contribution to future urban formations". The landscape urbanist way of thinking suggests that like urban form , like the ice adrift in the ocean, can no longer be understood in stasis or as a finite product, but must necessarily be understood as a "provisional state of matter", "continually on its way to becoming something else" (Corner, 2006) p29.

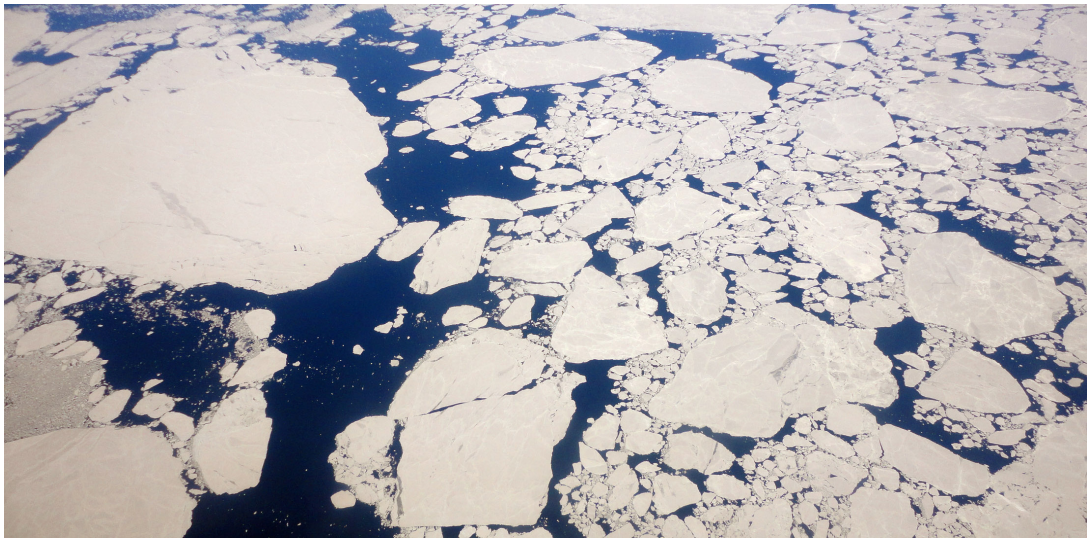

Figure 1: Antarctic ice adrift on the Ross Sea, analogous to the inverted figure ground of contemporary urbanism.

This essay is divided into two parts and is in part an exploration of the concept of 'urban' in relation to Antarctica and in part the application of and discussion of the themes proposed by Corner in relation to the human inhabitation of Antarctica. Part 1 begins by briefly outlining the way the term 'urban' is conceived and how its meaning has been transformed by the trend toward globalization. Antarctica's relationship to this shifting sense of urbaness is then discussed. In Part 2, by interpreting Corner's ideas on landscape urbanism in relation to a variety human activities and types of occupation in Antarctica the intention is to develop an applied understanding of the meaning of the themes of landscape urbanism in an Antarctic context and thereby make a contribution to the development of landscape urbanism as both a creative practice and a contemporary discourse on placemaking.

Part 1: The idea of an Urban Antarctica

As a human habitat, the Antarctic is unique for its paradoxical combination of stable and dynamic environments. At its centre, the East Antarctic Ice Sheet contains the most complete atomospheric time record on the planet, reaching back over 300,000 years. While at its edges, the annual variation in sea ice causes the surface area of Antarctic ice to double each year making it also one of the most dynamic surfaces on the planet.

This combination of time series continuity and rapid capacity for change provides a unique log upon which the human occupation of Antarctica has imprinted itself since Borchgrevink's party first wintered over on the continent in 1899, proving human inhabitation of the continent was possible. The symbol of this conquest, the hut at Cape Adare still stands today and is the sole surviving first human structure on any continent (Headland, 2009)

The term 'urban' has been much contested over the years, and a categorical definition has continually evaded description. What I wish to emphasize here is a transformation in the definition of urban over the last century and particularly in the years following the International Geophysical Year (IGY) 1957-8, and especially since the 1970s with the emergence of globalization in the popular vocabulary.

Geographers David Harvey and Neil Smith identify the 1970s and the global economic expansion of this era as being particularly transformative to the definition of 'urban' over the later part of last century. For this reason a definition urban provided by Dean S. Rugg (1972) is useful here as it identifies a both the traditional urban scene and a sense that due to external influences the forms of settlement considered urban were beginning to change. Rugg observed that the world trend toward urbanization had taken place since 1800, incidentally 27 years after Captain James Cook became the first to cross into the Antarctic circle, and identified urban as "the nucleated forms of settlement which are similar or related to those of the city" (p.8), these included hamlet, village, town, city, metropolitan area and conurbation. He noted that historically hamlet, village and town were considered rural but shift toward urbaness within farming communities at that time was changing this. The urbaness these farming communities were headed towards was not necessarily linked to urban density but the proximity to capital flows, mainstream media and consumables made possible through an increasingly centralized distribution of wealth and means of production.

In later years, Smith (2002) took this further noting “the urban is being redefined just as dramatically as the global, the old conceptual containers - our 1970s assumptions about what ‘the urban’ is or was - no longer hold water.” Smith goes on to say that increasingly global influences and the new functional demands they assert “changes not only the make-up of the city but the very definition of what constitutes - literally - the urban scale”. Ultimately the only notion of containment Smith offers to the concept of urban is that the scale of the modern city is merely a function of the mundanely derived limits determined by the daily commute of workers between home and work.

In light of this dissolving of the distinctions of the urban environment, for the military personnel who operate daily logistical flights to the ice in the Antarctic summer, the scientists and National Program employees who are stationed in Antarctica for the duration of winter, the nature photographer who sells calendars of Antarctic wildlife online from her living room in the city, and the second generation Antarctic cruise operators whose intimate knowledge of potential landing sites which anywhere else in the world we might consider ‘local’; the question as to what form the contemporary urbanization takes on in Antarctica and what form it might assume in the future quickly arises.

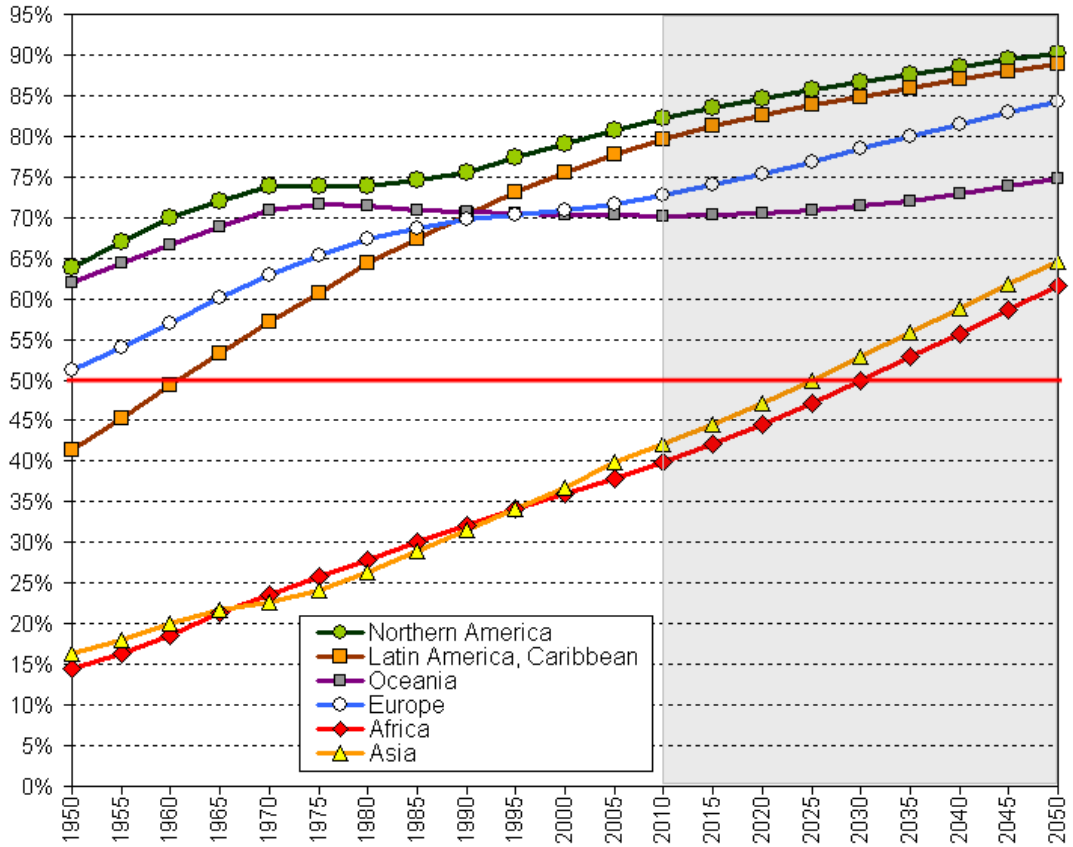

Figure 2: Global Urbanisation since 1950 showing UN projections to 2050. Source: (United Nations, 2009)

Urban Antarctica

It is proposed here that the relationship between Antarctica and urbaness can be separated into three groups. Firstly Antarctica as "the last wilderness" has operated as a necessary 'other', forming the backdrop of urban expansion over the last two centuries. Secondly, since IGY (1957-58), logistics and supply requirements for National Antarctica Programs have led to the development of so called Antarctic "gateway" cities in Australia, New Zealand, Argentina, Chile and South Africa directly linking urbaness to the ice. Finally it is observed, that the year round occupation and the increase in scale of national program activities in Antarctica since IGY is contributing to the development of specifically Antarctic physical forms of "urbanism".

Antarctica as 'other' than urban – the last wilderness

Since the technology derived from the industrial made the heroic era of Antarctic exploration a possibility the idea and human occupation of Antarctica has been inextricably connected our urban world. The pursuits of the heroic age were also connected to the triumph of culture over nature a battle which was fought on many urban frontiers, most famously in the Western States of the USA. The construction of the American wilderness lead the development of the 'back to nature movement' which rather than identifying wilderness as an object to be feared, drew on wilderness though science and art as a source of fascination.

Nash observed that "the back to nature movement was the response not of frontier pioneers but of urbanites; appreciation of wilderness began in cities" (Smith, 1984) p9.

The back to nature tradition is best represented today in the dramatic boom in Antarctic tourism since 1990. Since IGY an estimated 100,000 tourists have visited the Antarctic of these 70,000 visited since 1990 (Australian Antarctic Division, 2010).

Gateway cities, logistics and supply

Hemmings (2007) has observed that Antarctic isolation has ended, in more ways than ever Antarctica has become integrated into global cycles of commerce and has expressed concern that the Antarctic Treaty System (ATS) is currently insufficiently capable of coping with this expansion. One such instance of the globalistaion of the Antarctic 'brand' is the arrival on the world stage of centres known as 'Antarctic Gateway Cities', the southern hemisphere centres of Christchurch, Punta Arenas, Ushuaia, Capetown and Hobart represent the main ports of departure for Antarctica.

What is significant here is that the worlds largest 'wilderness' is only accessible through urban portals and that the ongoing feasibility of Antarctic settlements is contingent on the supply of good and services from these centres, Vectors of influence are channeled from within the urban environment of the gateway cities and implanted into the Antarctic landscape. The traditional centre/periphery/rural transition of the cities with which we are familiar is not possible in Antarctica and instead settlements take on this augmented form of existence.

Antarctic Gateway Cities such as Christchurch actively promote their connection to Antarctica in the global arena, and this relationship contributes significantly to the local economy. The transfer of materials and architectural styles from these centres and their regions also results in the extension of their urban expression to the Antarctic continent

itself. This relationship was made famous by Scott's Discovery Hut which was based a design adapted from the Australian Outback and proved less successful in the Antarctic.

Antarctic Settlements

I would here like to again call on Rugg's (1972) "nucleated forms of settlement" to propose a variety of scales of Antarctic 'urban' conditions. Firstly Antarctic stations are undoubtedly the most conspicuous physical indicators of an urban Antarctica. The most rapid phase of development of stations came immediately after IGY [Fig. 3] According to the Council of Managers of National Antarctic Programs (COMNAP) there are currently 37 year round stations and 12 seasonal stations in Antarctica. The Average population in winter across these bases is 1030 in winter and 3757 in summer. The largest of these McMurdo Station in the Ross Sea region with a winter population of around 250 and a summer population that can reach 1100 (COMNAP, 2011).

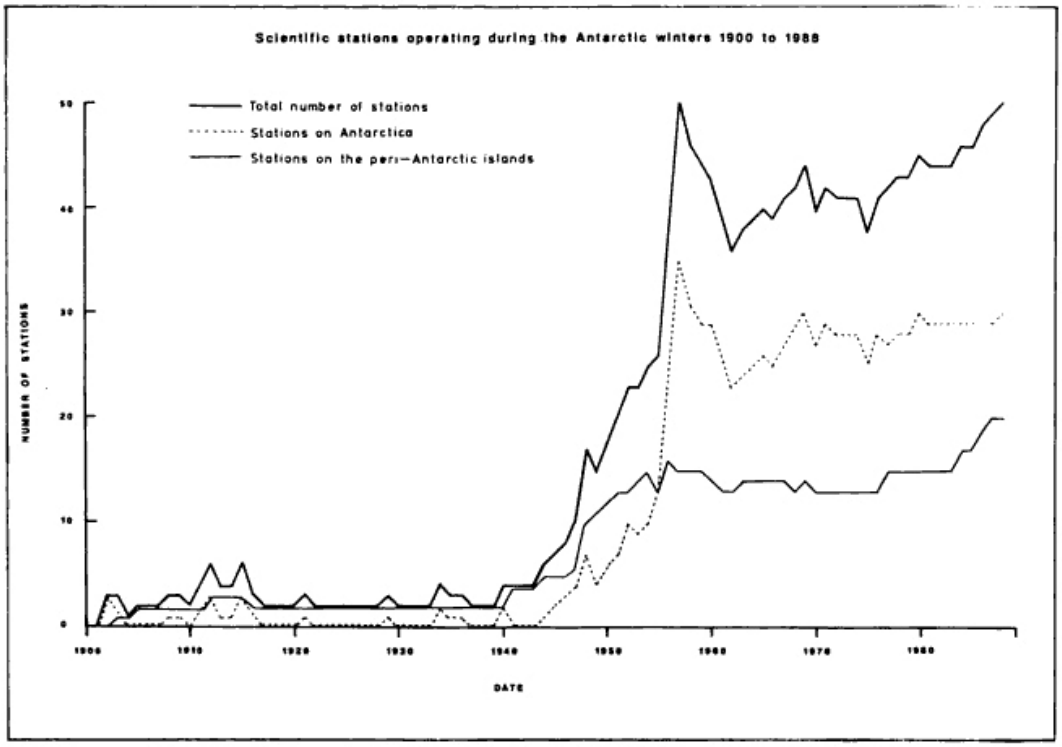

Figure 3: The cumulative growth of winter scientific stations in Antarctica. The rapid expansion of stations from 1950s to 1970s mirrors that of urban growth in the US and Europe at the same time.

In the 2010-11 summer season, filmmakers John Major and Frida Waara visited McMurdo [Fig. 4] to capture footage for their film Condition One, which is intended to reveal the "social pressures and inequalities of urban life through the seemingly disparate lives of teenagers in Detroit and the residents of Antarctica." (Major, forthcoming)

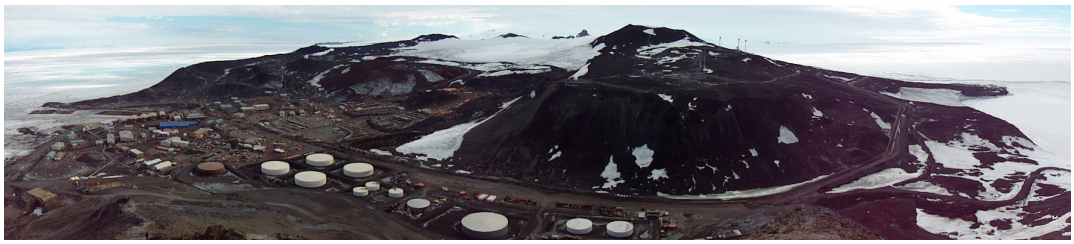

Figure 4 – Panoramic photo taken from Observation Hill, Ross Island showing McMurdo Station (left and centre) connected by roading, communications and energy generation infrastructure to Scott Base (far right).

Secondly, due to necessity, Antarctica has often been settled in an ad hoc manner – design responses have been based on immediacy of function and efficiency rather than long term capacity to evolve and adapt to changing contexts. This performative and adaptive criteria is a concept which is gaining traction as urban areas around the world begin to grapple with adaptation to climate change. The tendency toward ad hoc forms of occupation was particularly so prior to the establishment of the Antarctic Treaty System and in particular the Madrid protocol which initiated a comprehensive approach Environmental Impact Assessment (EIA) of activities in the Antarctic. Under the Madrid Protocol 1991 Antarctic Stations undergo increasing environmental monitoring and are managed to ensure minimum adverse effects on the Antarctic Environment.

Prior to the ATS, expedition camps operated as logistical nodes and the main areas of human inhabitation. Many of these sites are now being restored for their heritage value affording them status in perpetuity and signifying that the ongoing human occupation of Antarctica is certain.

In the contemporary sense, field camps, while brief in their existence, represent significant financial investments to programs and are critically dependant on the external logistics and supply capabilities which national programs offer. Field camps can operate for periods from days to years and in this time become vessels of the cultural processes of their inhabitants. For these reasons it is proposed here that they represent temporally and spatially small scale types of Antarctic urbaness. Field camps are also especially interesting for their relationship to necessity, ad hoc development and adaptability, all themes which have received increasing levels of attention in contemporary discussions of urban design.

Other obvious indicators of an emerging Antarctic urbaness are pollution eg. (Bargagli, 2008) and the loss of intrinsic wilderness values eg. (Tin, 2008). There is also an rapidly emerging depth of literature in social sciences research in and around Antarctic Stations particularly in the fields of psychology eg. (Palinkas, 2003) and in the arts through Artist in residence programs.

Lastly on the relationships between urbanization and Antarctica I would like to pick up on the work of Hulme on climate change in geography. Hulme points to an emerging view of climate as a "global aggregation" and identifies with climate change as both a physical transformation and a cultural object. According to Hulme, "climate is an idea which encapsulates the immersion of the physical with the cultural, in which local and global dynamics interweave and where the memory of the past meets the possibilities of the future." Climate change also provides important conceptual and physical links between the growth of urbanization and the Antarctic environment. In contemporary planning practice the understanding of climate and climate change is proving to be a powerful influence on the way cities and towns are planned for the future. Climate change is also contributing to an expansion of human activity and interest in Antarctica, bringing the continent ever closer to the urban world as our awareness of its role in climate dynamics grows.

Part 2: Exploring Terra Fluxus

The land comes and goes as the veil of stratus lifts and falls. - Robert Falcon Scott

Having established a relationship between the human occupation of Antarctica and the contemporary urban condition, I would now like to move on to explore *Terra Fluxus* (Corner, 2006). Corner's prospectus for the practice of landscape urbanism in a more exploratory sense. The idea being that by attempting to apply the mode of practice outlined in an 'urbaness' of spatial, climatic, social and geographic extremes, some contribution might be made to their conceptual and methodological development. The themes identified in *Terra Fluxus* are [1] processes over time, [2] the staging of surfaces, [3] the operational or working method and [4] the imaginary (p.28). Each theme is examined in relation to the human occupation and use of the Antarctic as articulated through a selection of disciplines and at a range of spatial scales, ranging from the international realm of environmental management to personal experience of the Antarctic landscape carving out a life in a field camp on the Ross Ice Sheet as part of Canterbury University's Post Graduate Certificate in Antarctic Studies (PCAS).

1. Processes over time

This theme is understood here as a prospective or interpretative activity rather than an actively generative one. In order to better acknowledge processes over time and the social, ecological and economic contexts which drive them, Corner calls for "a shift away from the object qualities of space (whether formal or scenic)" to focus on "the systems that condition the distribution and density of urban form" (p.28). He proposes field and process diagrams as a means of better understanding the dynamics and interrelationships of processes and forces which flow through territories traversing spatial and temporal scales. In this instance Corner says "ecology becomes a useful lens to study incremental effects that evolve the shape of an environment over time." The use of time series analysis in the natural sciences has a long history, though landscape, architectural and urban mappings to facilitate the design process often tend toward creative sampling and selection rather than adherence to methods required to support serious scientific activity. Despite this, time series as a means of communication may be one method which can be effective in facilitating the interdisciplinary approach Corner promotes.

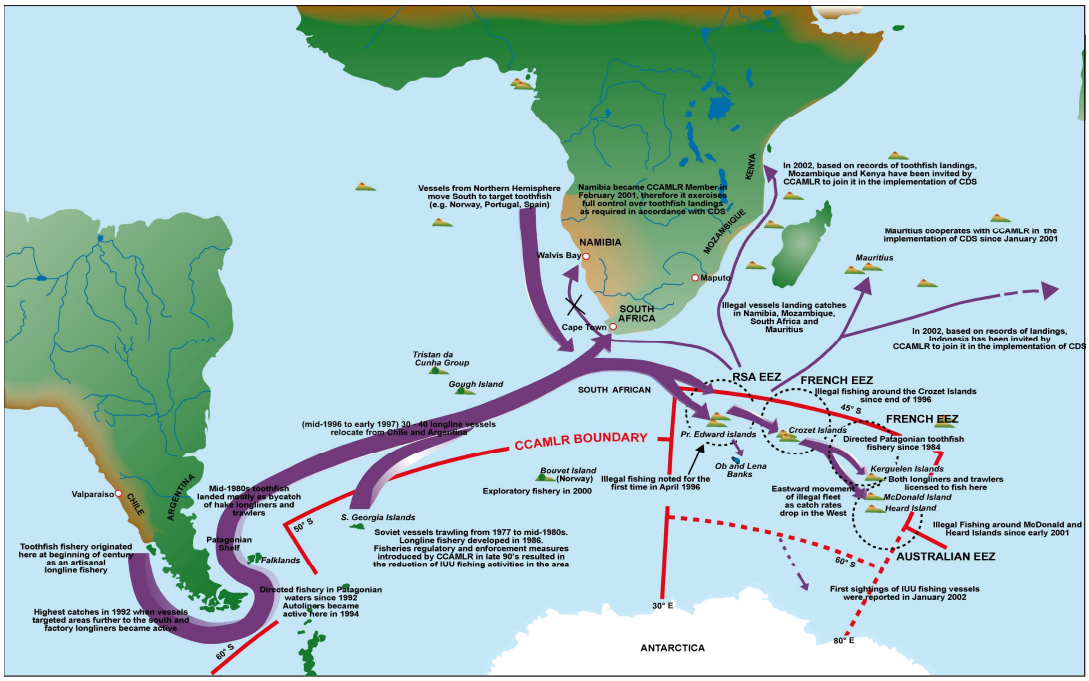

Figure 5: Process diagram showing the growth and expansion of the Antarctic Toothfishery leading to the establishment of Illegal Unreported and Unregulated (IUU) fishing vessels in the Ross Sea Region in 2002 Source: (Miller, 2007)

Antarctic Toothfishery

Corner demands that we begin to look at the "entire metropolis as a living arena of processes and exchanges over time" (p.30). As identified earlier however, the extent of the metropolis is increasingly hard to define. Figure 5 (Miller, 2007) is derived from the realm of fisheries management and reveals the expansion of the Antarctic toothfishery from the beginning of last century to 2002. The process captured here is one which moves from sustainable cultural practice, to wider growth in demand, technological innovation to support demand, commercial exploitation and over fishing, regulation, enforcement and the establishment of illegal industry. As a luxury item, this process has been driven by the growth of the market for toothfish in high class urban restaurants of cities around the world. The effective management of the toothfishery is as much an urban cultural problem as it is an ecological and regulatory one. The issues with the toothfishery are evidence that the 'metropolis' referred to by Corner extends far beyond its historical boundaries.

Historic Preservation

At a much finer scale, the work of Ricardo Roura (2009) examining the effects of cultural and natural process, mainly disturbance from tourists and wind effects on historic features in Antarctica and Svalbad. Interestingly, in his conclusions Roura observes that many of the historic features examined actually showed an improvement in their condition over the

study period. Roura cites the work of M.B.Schiffer (Schiffer, 1972) in the field of Behavioral Archaeology to explain this. Schiffer's theory states that cultural (c-transformations) and natural (n-transformations) processes are responsible for the distinction of either the 'systemic context' (the original dynamics between culture and material objects) or the 'archaeological context' (the record of artefacts examined by archaeologists). It is clear that for historical items observed by Roura c-transformations are still such that the systemic context of the artifacts is still operational and as such the dynamic between the material objects and contemporary culture endures [Figs 6&7].

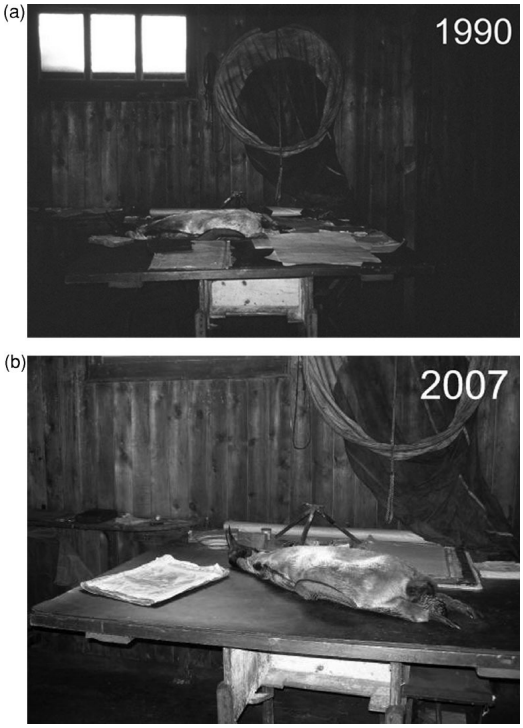

Figure 6: The chart table of R.F. Scott in the Terra Nova hut at Cape Evans, Ross Island, in 1990 and late 2007 (Roura, 2009)

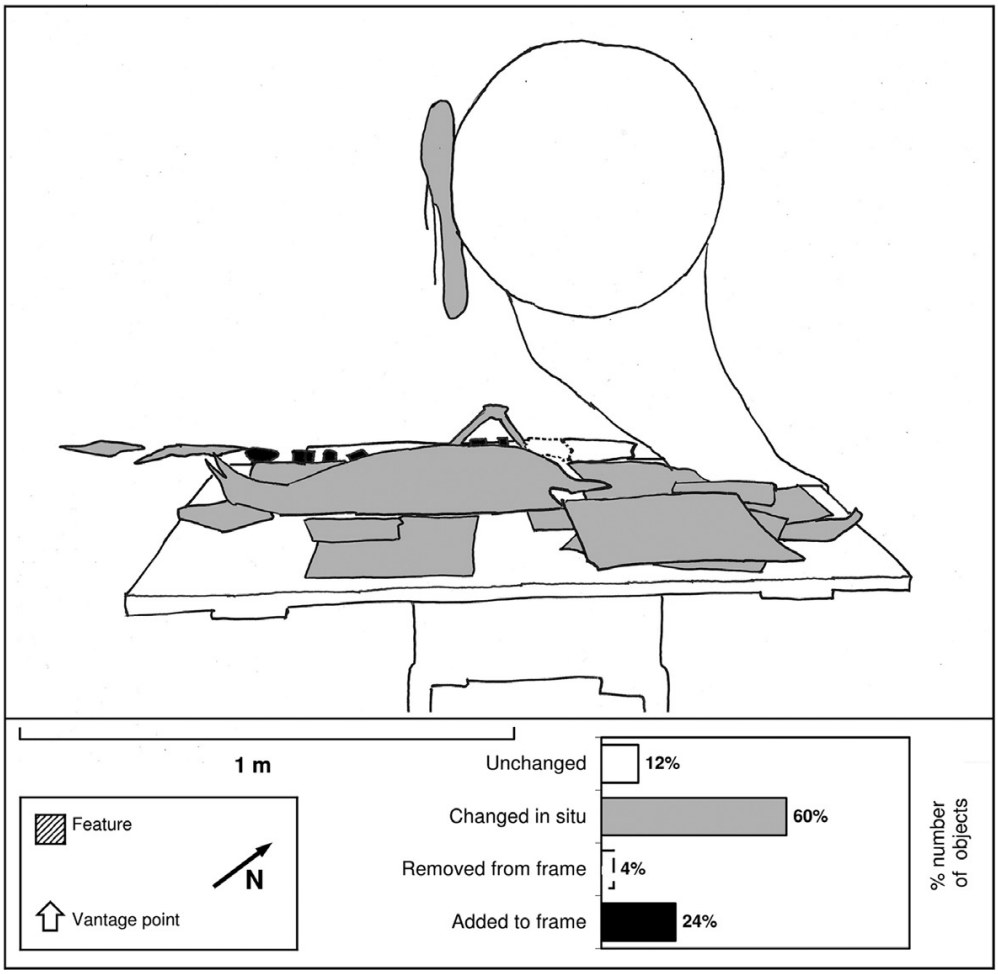

Figure 7: Overview of changes at the chart table of R.F. Scott in the Terra Nova Hut. Source (Roura, 2009)

This theoretical link between the systemic context and the archaeological context may have application for the dialectic discussed by Corner under this theme and the potential for application in theorizing and selectively re-enforcing or destabilizing the "provisional state of matter". This theme seems most valuable for its ability to reveal sites which have the potential for new creative projects.

2. The Staging of Surfaces

This theme is understood as being important for its generative, or perhaps more appropriately facilitative agency and concerns itself with the structuring, ordering, and strategizing of the horizontal surface or ground plane. This system of ordering and re-ordering may be derived from an abstract geometric system or through a strategic approach to infrastructural elements. "Unlike architecture, which consumes the potential of a site in order to project, urban infrastructure sows the seeds of future possibility, staging the ground for both uncertainty and promise"(p.31). In discussing this, the historical precedent of the

grid is one which receives much attention. In Antarctica, rather than the grid, the structuring device which most rapidly comes to mind is the configuration of territorial claims, originating at the South Pole and radiating outwards over the continent [Fig 8].

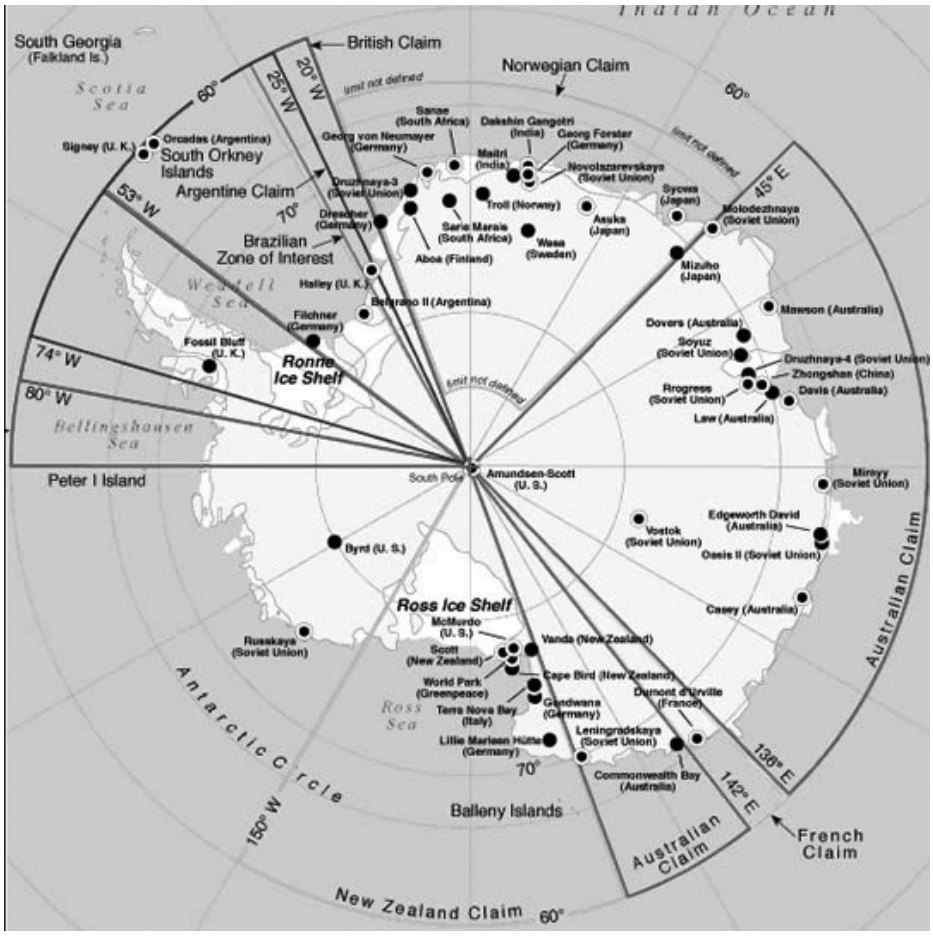

Figure 8: Map showing Antarctic claim areas radiating from the South Pole

Corner's call for an "urbanism which anticipates change, open-endedness and negotiation" (p.31) seems particularly fitting to this example, though in the case of the ATS, for the time being anyway, these qualities are imbued through the specifics of the Treaty rather than derived from potential of the radial ordering of geographical space in itself.

Field Camp

At a smaller scale the radial arrangement of surface was also employed during the PCAS field camp this time inscribed within a circle rather than radiating from its centre. Here the a radial organization of surface was employed firstly to define a necessary area of safe enclosure for operations within the camp, and secondly as a means of providing an experiential connection to the landscape elements of Ross Island, most notably Mt Erebus [Fig 9].

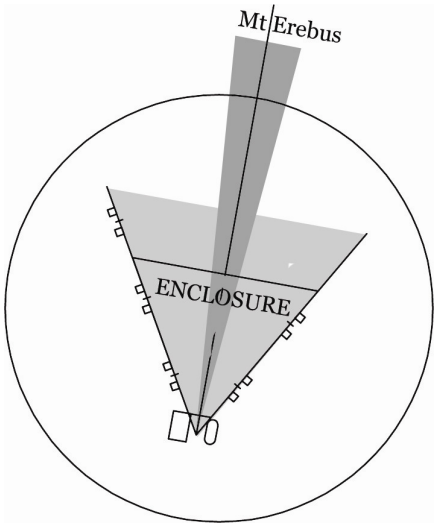

Figure 9: surface configuration for PCAS field camp.

Beyond the physical staging of site Corner also identifies secondary benefits to the legible staging of surfaces – "the potential to provisionally stage a site in different ways at different times for various programmatic events" (p.31). This was certainly a feature of the PCAS camp which through the application of modularity at a variety of scales within the initially prescribed field was able to absorb multiple and divergent programmes within its field of activity [Fig. 10].

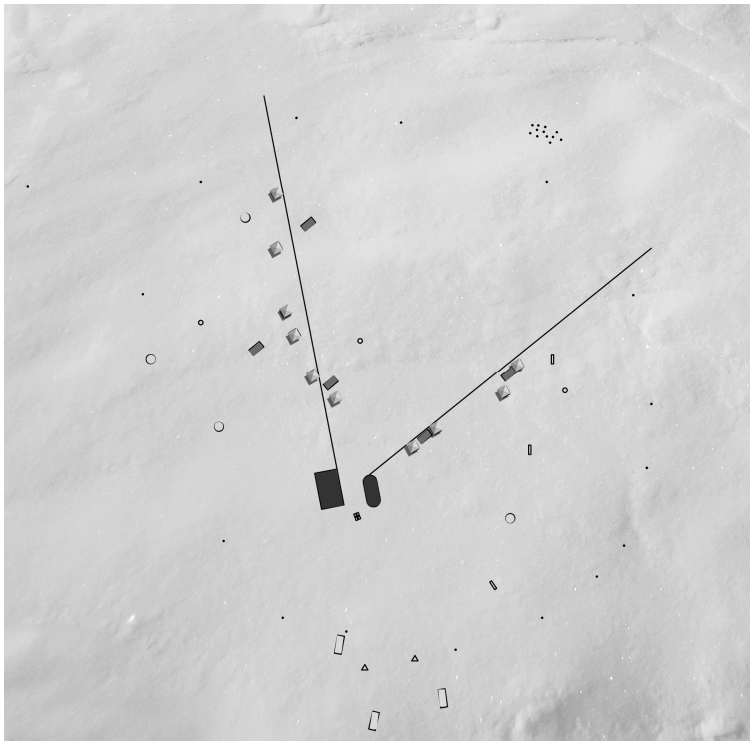

Figure 10: Plan of how the PCAS field camp actually evolved in relation to the staging of the surface

Antarctic Clothing

To my mind, the tendency of this theme to adhere so strongly to the horizontal plane as an ordering surface is an unnecessary limitation on the three dimensional complexity of the world particularly when working at a finer scale. This focus on horizontality is perhaps a genealogical throwback to conventional top down approaches to planning. Whilst landscape urbanism is frequently happy to expand its scales operation to assert its geographical area of influence, a reduction in scale provides a more useful frame through which to challenge the horizontality of the staged surface. In the harsh Antarctic climate I propose that personal Antarctic clothing presents a type of Antarctic urban territory in itself and with its diversity of pockets and the combinations of layers in which it can be worn offers a uniquely three dimensional architectural field within which the daily operations of the Antarctican are organized. [Fig. 11 & 12]

Figure 11: The four layers of Antarctic clothing as provided to event personnel as part of the New Zealand Antarctic program on display at the Antarctic Centre in Christchurch


1
2
3
4
4
5
5
2
+2
mod.
2
A
2
2
2
B
1
1
1

3. The operational or working method

The discussion of this theme suggests a reconsideration of traditional conceptual, representational and operative techniques used in the creation of urban form. Here the disciplinary conflation which Corner calls for is expanded to include a far wider breadth of professionals than are outlined in his introduction. The first approach in the exploration of this theme was to explore a synthesis of the stages of the process from concept to representation and implementation. A small scale project, the construction of a snow shelter, was undertaken as a simultaneous design/build process. The second exploration in relation to this theme was a synthesis of scale, drawing media, material, daily ritual and the experience of the Antarctic landscape.

The Lofted Trench

Emergency snow shelters are an embodiment of immediate necessity. The Antarctica New Zealand Field guide proposes a number of methods for constructing emergency shelter for one or two people and for larger groups. These include the single person trench, complex trench for two people, snow mounds for groups and the snow cave [Fig. 14].

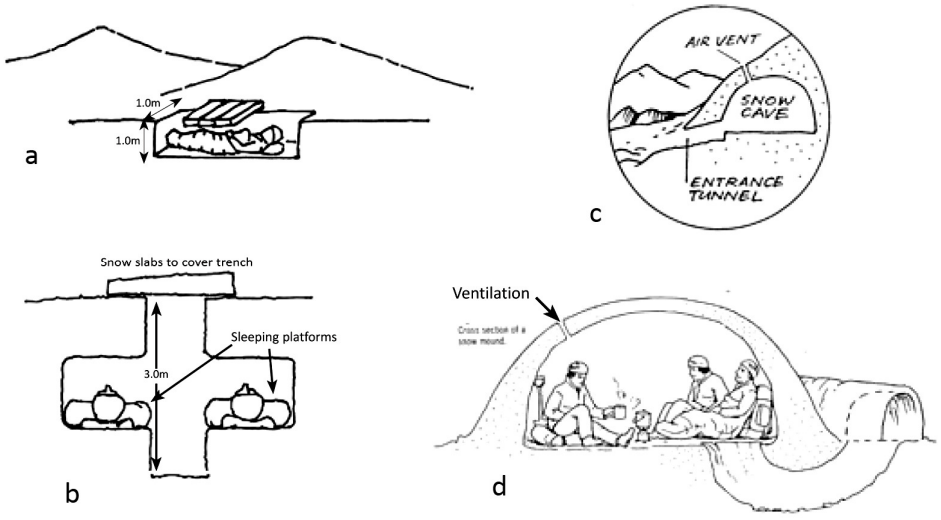

Figure 14: Types of snow shelter A) Single person trench B) Complex trench C) Snow cave D) Snow Mound.

In an emergency situation the decisions on which shelter is most appropriate will depend on the size of the group, the time taken to build the structure and the energy expenditure required.

Whilst in the field, the lofted trench was designed to be quick and efficient to build with just one person required for construction. Simple structural principles however mean the structure is also easily extendable. Rather than being based on standard units, the setting out of the structure was based on units derived from the tools at hand, the dimensions of a standard snow saw and shovel. The two units used were the saw length including the handle a and the blade length b, the angle of the shovel head also determined the rake on the internal walls of the structure [Fig. 15 &16].

The advantage of the lofted trench over either the single person trench or the complex trench is minimized excess digging, rapid provision of shelter and the strength and adaptability of the structure. The basic structure can be extended to accommodate a larger group or deteriorating weather conditions. The lofted trench is identified as a design which whilst making do and meeting an immediate need, does not preclude adaptation over time.

Figure 15: Completed Trench

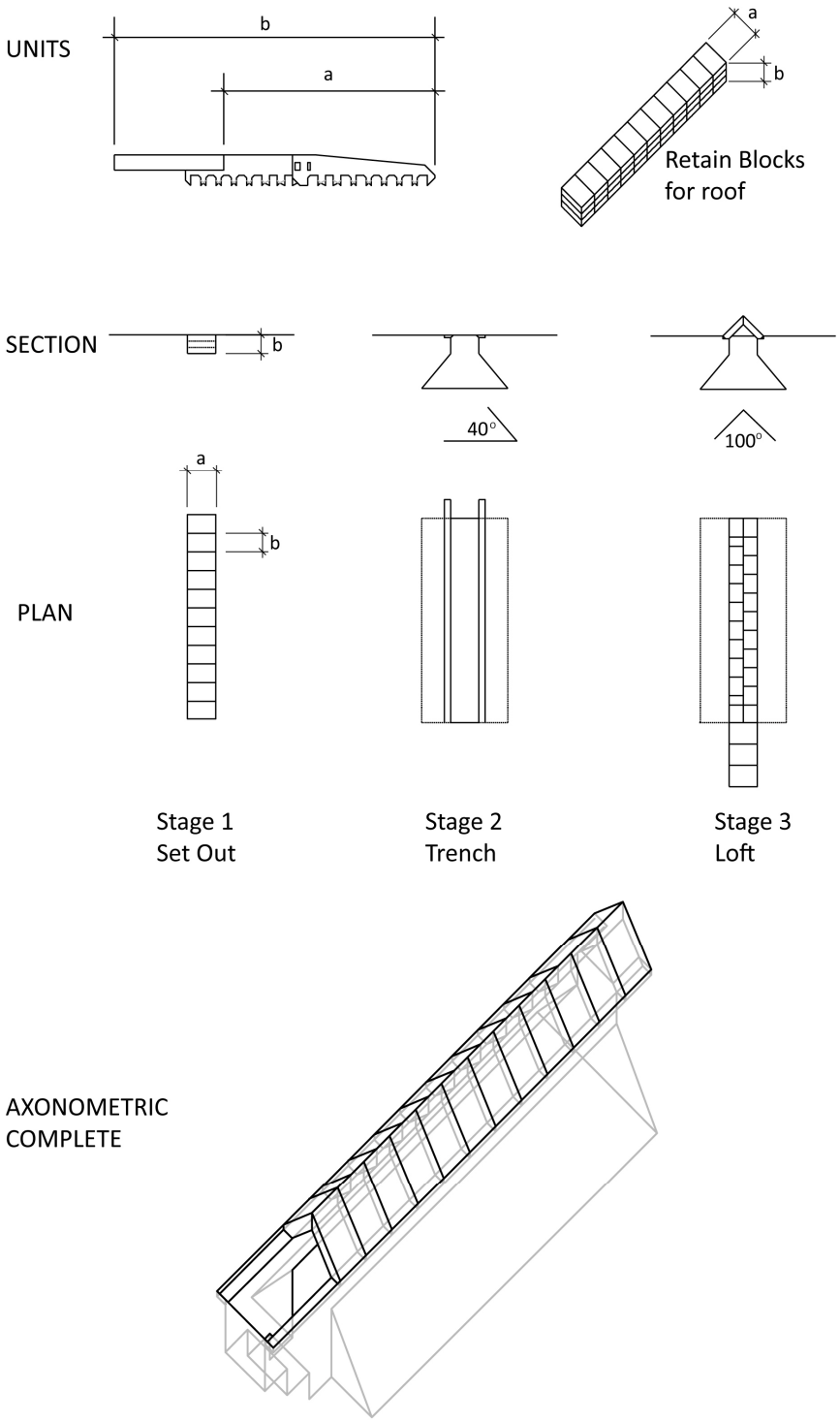

Figure 16: The lofted trench showing stages of construction and three dimensional volume of a basic module. The basic module can be extended in length, depth or at right angles without adversely compromising the structure.

Antarctic brushes – amalgamation of representation and tool

This exercise was undertaken partially in response to Corner's call for a reconsideration of traditional conceptual and representational techniques. Each day in the field was organized around a particular activity with each activity associated with a separate journey or narrative through the Antarctic landscape. Narratives were recorded for each day using a combination of GPS mapping, field notes sketches and photography as well as materials which could be legally derived from Antarctica. Upon reaching the daily destination a consistent ritual was conducted (cutting of hair) and the waste product of this ritual retained for incorporation into the tool. Waste material derived as a by-product of the conservation process of historic huts in the Ross Sea region (waste timber) was also salvaged on the second day and incorporated in to the tools [Fig.17].

Figure 15: Selection from the Antarctic Brushes series exploring the conflation of the representation, the tool and the experience in the interpretation of the Antarctic landscape

4. The Imaginary

This theme is about future possibilities. As a group, and measured by their geographical area of influence, The Antarctic Treaty states represent perhaps one of the most ambitious design collectives on the planet. Indeed the introduction of the Antarctic Treaty in 1961 was at its core a creative act towards the formation of a continent for peace and science. Corner's words, though probably intended for a smaller geographical unit are fitting. "Public places are firstly the containers of collective memory and desire, and secondly they are the places for geographic and social imagination to extend new relationships and sets of possibility (p.32)."

We should question however whether in the globalised and increasingly populated world of this century the ATS still represents a creative link between the lived and the legal worlds.

Conclusion

Hemmings (2007) has emphasized that in a global age the concept of Antarctic isolation is fast becoming outdated. It has been proposed here that Antarctica, through its human settlements and influences represents a form of urban frontier. The significance is that the urban world is expanding to Antarctica at the same time as urban theorists are challenging the historical foundations and assumptions of the practices of urbanism.

The intention of this paper in Part 1 has been to initially to identify emerging areas of Antarctic 'urbaness' in an attempt to establish a more critical ways of thinking about how Antarctica is being urbanized, beyond the established regulatory procedures of environmental management and Environmental Impact Assessment, and towards a more inspired and creative means of place making.

In the second half the emerging urban theory of landscape urbanism was examined in relation to the emerging and experienced human environments of Antarctica in an attempt to gain insight into the methods proposed. The experiments conducted here are not meant to trivialize Corner's statements or proposals, but use his essay as a stepping off point to explore and look at the future urban practice and the imagination of the places we live in new ways, with relevance for both established and future urban environments.

Landscape urbanism has been criticized by many for its use of jargon and understanding Corner's intent certainly became one of the critical issues in trying to interpret themes as this work progressed. Applying them as concepts to the inhabitation of Antarctica, not known for its urbaness, also proved conceptually and logistically challenging.
If process drives form as the landscape urbanists suggest, the exploration of Corner's themes as a process in its self is perhaps as significant as the results and conclusions drawn.

One realization I have come to with some regret through this process is that Antarctica's reputation as the last wilderness is not likely to endure forever. My hope is that the place that we make in it's midst is as inspiring as the place on which it was founded. On the

question of placemaking, in Antarctica as elsewhere in a globalised world, we can't afford to let commerce alone be the most creative agent on the continent.

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